Docket 80632RLW
Customer No. 01333

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

Jiebo Luo, et al

DIGITAL IMAGE PROCESSING SYSTEM AND METHOD FOR EMPHASIZING A MAIN SUBJECT OF AN IMAGE

Serial No. 09/642,533

Filed August 18, 2000

Group Art Unit: 2623

Examiner: Wu, Jingge

I hereby certify that this correspondence is being deposited today with the United States Postal Service as first class mail in an envelope addressed to Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Anita Marie Barker
Anita Marie Barker

August 25 2004
Date

Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

APPEAL BRIEF TRANSMITTAL

Enclosed herewith in triplicate is Appellants' Appeal Brief for the above-identified application.

The Commissioner is hereby authorized to charge the Appeal Brief filing fee to Eastman Kodak Company Deposit Account 05-0225. A duplicate copy of this letter is enclosed.

Respectfully submitted,

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IFW

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APPEAL BRIEF PURSUANT TO 37 C.F.R. 1.192

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APPELLANT'S BRIEF ON APPEAL

Appellants hereby appeal to the Board of Patent Appeals and Interferences from the Examiner's Final Rejection of claims 91-130 which was contained in the Office Action mailed.

A timely Notice of Appeal was filed July 6, 2004.

Real Party In Interest

As indicated above in the caption of the Brief, the Eastman Kodak Company is the real party in interest.

Related Appeals And Interferences

No appeals or interferences are known which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

Status Of The Claims

Claims 91-152 are pending in the application.

Claims 1-90 are cancelled.

Claims 131-152 stand withdrawn from consideration.

This appeal is directed to Claims 91-130 which stand finally rejected by the Office Action dated April 6, 2004. Appendix I provides a clean, double spaced copy of the claims on appeal.

Status Of Amendments

No amendments were filed subsequent to the Final Rejection.

Summary Of The Invention

Applicant's invention is directed to the automatic identification of the main subject of an individual image and, automatically altering the identified region of the image to emphasize the identified region.

As noted in the prior art, it was known in the motion picture industry, at the time of the present invention, to manually identify the main subject of an image or frame. After the main subject had been manually identified, such as by

manually outlining the subject of interest, the color values were changed to emphasize the identified region. The process was labor intensive and limited by cost and inconvenience.

To overcome this problem, the applicant's apparatus as defined in the Claims, to the effect that the main subject of an image is automatically identified so that the pixel values of the image can then be automatically altered to emphasize the main subject.

Identification of the main subject may be accomplished by segmentation of the image into regions. A main subject belief map of the regions may be generated. The belief map may be generated by calculation of saliency level.

Pixel alteration may involve changing pixel color saturation, hue, luminance, blur, saturation, or inversion. The pixel values of the main subject or the pixel values that are not a part of the main subject may be altered.

Issues For Review By The Board

The following issue is presented for review by the Board of Patent Appeals and Interferences: Are Claims 91-130 unpatentable as being anticipated by Luo et al. 6,504,951 under 35 U.S.C. 102(e)?

Grouping Of Claims

The patentability of claim 91-130, for purposes of this appeal only, stands or falls together.

Arguments

The Rejection

In rejecting Claims 91-130, the Examiner proposes that Luo et al. teaches automatically identifying a main subject, which the Examiner suggests is the sky.

The Examiner finds that the pixel values are automatically altered to emphasize the main subject (the sky) by eliminating pixels having a texture above a threshold or by filling voids of connected components. The Examiner states that the pixel altering (thresholding, eliminating and region growing) are conducted after identifying the main subject, the sky.

The Arguments

First, it should be noted that the following comments interpreting the Luo et al. '951 reference come from Jiebo Luo, one of the inventors of the present application and the first-named inventor of the reference. Accordingly, it is felt that the interpretation of the disclosure of the reference should be given exceptional weight.

Luo et al. does not disclose automatically identifying a main subject of the image:

Luo et al. '951 teaches a procedure for detecting a sky region in an image. If an image is determined to include a sky, it is a strong indicator that the image is an outdoor scene. This information my be used as a guide for manipulation tasks such as orientation of the image or excluding the sky region in detecting the main subjects in the image (col. 1, lines 48-52).

Accordingly, early on we see that the Examiner's contention that Luo et al. discloses a method for "automatically identifying a main subject (candidate sky) of the image" (Final Rejection pg. 3, Paragraph 7, line 5) is incorrect. In fact, Luo et al. specifically states "in detecting main subjects in the image, sky regions can usually be excluded because they are likely to be part of the background." (col. 1, lines 48-52).

Luo et al. does not disclose automatically altering pixel values of said image to emphasize said main subject, said altering following said identifying:

Even if the sky region detected by Luo et al. '951 was in fact the main subject of the image, there is no disclosure of altering pixel values of the image to emphasize the sky following its identification.

The Examiner contends that Luo et al's process of eliminating pixels having texture above a threshold value and the process of filling voids of connected components emphasize the sky. The Examiner further contends that these processes are done after the sky has been identified. Appellants traverse this contention.

In fact, Luo et al's steps of eliminating pixels having texture above a threshold or filling voids of connected components are steps towards finding sky regions because sky regions are smooth (and thus not textured). Since the process is intended to find sky regions, it by definition can not take place after the sky has been identified. The eliminating pixels step in Luo et al. is an intermediate step in finding sky regions.

Further, the step of eliminating pixels having texture above a threshold or filling voids of connected components are not done to alter the pixel values for emphasizing the sky regions. Emphasizing a region relative to other regions does not mean, in the context of the present application, eliminating the other regions; it simply means that the other regions are not emphasized.

Summary

Luo et al. does not disclose automatically identifying a main subject of the image. Nor does Luo et al. disclose automatically altering pixel values of the image to emphasize the main subject, the altering following the identifying step.

Conclusion

For the above reasons, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejection by the Examiner and mandate the allowance of Claims 91-130.

Respectfully submitted,

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Appendix I - Claims on Appeal

91. (Previously presented) A method for modifying an image having pixels, comprising the steps of:

automatically identifying a main subject of the image, and

automatically altering pixel values of said image to emphasize said main subject, said altering following said identifying.

92. (Previously presented) The method of Claim 91 wherein said identifying further comprises segmenting said image into regions.

93. (Previously presented) The method of Claim 92 wherein said identifying further comprises generating a main subject belief map of said regions.

94. (Previously presented) The method of Claim 91 wherein said altering pixel values further comprises altering pixel color saturation.

95. (Previously presented) The method of Claim 91 wherein said altering pixel values further comprises altering pixel hue.

96. (Previously presented) The method of Claim 91 wherein said altering pixel values further comprises altering pixel luminescence.

97. (Previously presented) The method of Claim 91 wherein said altering pixel values further comprises altering pixel blur.

98. (Previously presented) The method of Claim 91 wherein said altering emphasizes said main subject by altering pixel values that are a part of said main subject.

99. (Previously presented) The method of Claim 91 wherein said altering emphasizes said main subject by altering pixel values that are not a part of said main subject.

100. (Previously presented) The method of Claim 91 wherein said altering further comprises desaturating the pixels that are not a part of said main subject.

101. (Previously presented) The method of Claim 100 wherein said desaturating further comprises:

calculating the luminance values for the pixels that are not a part of said main subject, and

replacing the color values of the pixels that are not a part of said main subject with respective luminance values.

102. (Previously presented) The method of Claim 91 wherein said altering further comprises enhancing saturation of the pixels that are a part of said main subject.

103. (Previously presented) The method of Claim 91 wherein said altering further comprises inverting the pixel hue values of the pixels that are a part of said main subject.

104. (Previously presented) The method of Claim 91 wherein said altering further comprises inverting the pixel hue values of the pixels that are not a part of said main subject.

105. (Previously presented) The method of Claim 91 wherein said identifying further comprises the steps of:

segmenting the image into a plurality of regions based on uniform image characteristics;

calculating a level of saliency for said plurality of regions, and

assigning a believe value to the pixels corresponding to said level of saliency.

106. (Previously presented) A system for modifying an image having pixels, comprising the steps of:

means for automatically identifying a main subject of the image, and

means for automatically altering pixel values of said image to emphasize said main subject, said altering following said identifying.

107. (Previously presented) The system of Claim 106 wherein said means for identifying further comprises means for segmenting said image into regions.

108. (Previously presented) The system of Claim 107 wherein said means for identifying further comprises means for generating a main subject belief map of said regions.

109. (Previously presented) The system of Claim 106 wherein said means for altering pixel values further comprises means for altering pixel color saturation.

110. (Previously presented) The system of Claim 106 wherein said means for altering pixel values further comprises means for altering pixel hue.

111. (Previously presented) The system of Claim 106 wherein said means for altering pixel values further comprises means for altering pixel luminescence.

112. (Previously presented) The system of Claim 106 wherein said means for altering pixel values further comprises means for altering pixel blur.

113. (Previously presented) The system of Claim 106 wherein said means for altering emphasizes said main subject by altering pixel values that are a part of said main subject.

114. (Previously presented) The system of Claim 106 wherein said means for altering emphasizes said main subject by altering pixel values that are not a part of said main subject.

115. (Previously presented) The system of Claim 106 wherein said means for altering further comprises means for desaturating the pixels that are not a part of said main subject.

116. (Previously presented) The system of Claim 115 wherein said means for desaturating further comprises:

means for calculating the luminance values for the pixels that are not a part of said main subject, and

means for replacing the color values of the pixels that are not a part of said main subject with respective luminance values.

117. (Previously presented) The system of Claim 106 wherein said means for altering further comprises means for enhancing saturation of the pixels that are a part of said main subject.

118. (Previously presented) The system of Claim 106 wherein said means for altering further comprises means for inverting the pixel hue values of the pixels that are a part of said main subject.

119. (Previously presented) The system of Claim 106 wherein said means for altering further comprises means for inverting the pixel hue values of the pixels that are not a part of said main subject.

120. (Previously presented) The system of Claim 106 wherein said means for identifying further comprises the steps of:

means for segmenting the image into a plurality of regions based on uniform image characteristics;

means for calculating a level of saliency for said plurality of regions, and

means for assigning a believe value to the pixels corresponding to said level of saliency.

121. (Previously presented) A method of modifying an image having pixels, comprising the steps of:

automatically generating one or more belief values, each said belief value being associated with one of a plurality of regions of the image, said belief values each being related to the probability that the associated region is a main subject of the image;

following said generating, automatically altering pixel values in said plurality of regions of said image, in accordance with said associated belief values.

122. (Previously presented) The method of Claim 121 wherein said altering further comprises:

determining a saturation value for each pixel; and

altering the pixel saturation values according to said associated belief values.

123. (Previously presented) The method of Claim 121 wherein said altering further comprises:

determining a luminance value for each pixel; and

altering the pixel luminance values according to said associated belief values.

124. (Previously presented) The method of Claim 121 wherein said altering further comprises:

determining a hue value for each pixel, and

altering the pixel hue values according to said associated belief values.

125. (Previously presented) The method of Claim 121 wherein said altering further comprises:

determining a blur value for each pixel, and

altering the pixel blur values according to said associated belief values.

126. (Previously presented) A method of modifying an image having pixels, comprising:

automatically generating a main subject belief map containing values indicating the location of a plurality of regions in the image, said main subject belief map containing at least a first belief value associated with one of said plurality of regions, said belief values being related to the probability that the associated region is a main subject of the image; and

automatically altering pixel values in said plurality of regions of said image, in relation to said associated belief values, said altering following said generating.

127. (Previously presented) The method of Claim 126 wherein said altering further comprises:

determining a saturation value for each pixel, and

altering the pixel saturation values according to said associated belief values.

128. (Previously presented) The method of Claim 126 wherein said altering further comprises:

determining a luminance value for each pixel, and

altering the pixel luminance values according to said associated belief values.

129. (Previously presented) The method of Claim 126 wherein said altering further comprises:

determining a hue value for each pixel, and

altering the pixel hue values according to said associated belief values.

130. (Previously presented) The method of Claim 126 wherein said altering further comprises:

determining a blur value for each pixel, and

altering the pixel blur values according to said associated belief values.